Bio:

Christos Papachristos is an Assistant Professor (Tenure-Track) at the Department of Computer Science and Engineering of the University of Nevada Reno. He is the director of the Robotic Workers Lab, whose research activities focus on autonomous systems and field robotics including Unmanned Aerial Vehicles and Mobile Manipulation Systems, emphasizing on reliable long-term autonomy and resourceful physical interaction in-the-wild. In the past he has been a Research Assistant Professor with the Autonomous Robots Lab and the winning team CERBERUS of the DARPA Subterranean Challenge, and has participated in several multi-million projects on both sides of the Atlantic. Dr. Papachristos obtained his Ph.D. at the University of Patras in Greece in 2015. His research is guided by the vision for ubiquitous autonomous robots that exhibit operational resilience in harsh settings and self-sustaining capabilities, by relying on novel system design, multimodal perception, intelligent exploration, and advanced mobility, as well as advanced mission resourcefulness through mobile manipulation and situationally-cognizant physical interaction with their environment.

Project abstract:

Towards these goals, this new NASA EPSCoR project titled "Prospecting and Pre-Colonization of the Moon and Mars using Autonomous Robots with Human-in-the-Loop" aims to facilitate humankind's next great endeavor of deep space exploration and colonization, aligned with NASA's Moon-to-Mars mission and its vision for a prospective path among the stars. In preparation for human colony establishment, we aspire to develop a new generation of Space Worker Robots armed with unprecedented capabilities, such as performing Surface Engineering by leveraging novel Self-Deployable Cable-Driven Parallel Robot designs, as well as autonomously characterizing the remote planetary environment by exploring and mapping resources, volatiles, and potential hazards, while remaining energy-aware and efficient. We additionally aim to develop a realistic framework that enables human cognition to coordinate the colonization tasks, with a novel communication-efficient paradigm that can remain viable at inter-planetary distances. This Interactive Digital Worksite Twin framework will facilitate asynchronous virtual-reality interaction at the Earth-side to specify low-bandwidth goal-states and task plans that can be relayed to the off-planet Space Worker Robots which will attempt to execute them autonomously, while remaining vigilant for any mission-altering changes in the real remote environment that require Earth-side synchronization and replanning. To accomplish these challenging objectives, we have assembled a team of experts from UNR, UNLV, and DRI, with established track-records in the domains of field robotics and autonomy, computer vision, machine learning and artificial intelligence, environmental monitoring, and virtual reality and user interface design, as well as collaborations with NASA's Ames Research Center.